# ARSH TANGRI

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## EDUCATION

**Northeastern University** Sept 2022 - Dec 2024
Master of Science in Robotics (Computer Science), Thesis GPA - 4.0/4.0

**Manipal Institute of Technology** July 2018 - July 2022
Bachelor of Technology, Electronics and Communication Engineering GPA - 8.67/10

## TECHNICAL SKILLS

**Languages** Python, C++, MATLAB, C
**Software** Pytorch,Tensorflow, ROS, NumPy, SciPy, Linux, OpenCV, Scikit-Learn,Git, Pandas, Open3D, PCL, Tensorboard, Weights & Biases, Blender

## WORK EXPERIENCE

- **Amazon Robotics** July 2023 - December 2023
*Data-Science Intern (Robotic Manipulation)*
- Developed and trained neural network policies using a PointNet++ backbone with PyTorch-Lightning, leveraging Multi-GPU training, to map scene point clouds to 6-DoF grasp poses, enabling robotic picking of raw, unpacked Amazon items.
- Designed a novel extension of an Offline Reinforcement Learning algorithm to effectively train neural networks on abundant sub-optimal data for segmenting graspable regions of the scene pointcloud, and generating grasp orientation angles.
- Improved over the baseline by 6% on the pick-success rate metric in the in-house picking simulator Gemini.

- **The Helping Hands Lab, Northeastern University** Oct 2022 - Present
*Research Assistant, Principal Investigator: Dr. Robert Platt*
- Fine-tuned the Segment-Anything Model and a DETR Object Detection Model using Detectron for detecting and segmenting individual objects in cluttered warehouse totes. Achieved a 23% higher AP-75 score compared to Mask-RCNN baseline.
- Augmented a SOTA Robotic Manipulation framework (Transporter Net) using Rotation-Equivariant CNNs (E2CNN Pytorch Library) for Goal-Conditioning for Visual Goal-Based manipulation tasks, achieving a 36% improvement in pick-success rate.
- Developed novel rotation-equivariant versions of Offline-Reinforcement Learning algorithms (CQL, IQL) for vision-based robotic-manipulation tasks, achieving a 54% improvement in task-success over their non-equivariant counterparts.
- Developed a novel rotation-invariant contrastive learning algorithm for goal-conditioned reinforcement learning, leading to a 25% improvement in task success for vision-based robotic manipulation tasks over non-equivariant methods.
- Implemented and tested Imitation Learning and Offline-RL policies on a UR5 robotic-arm.

- **Ecole de Technologie Superieure, Montreal, Canada** July 2021 - May 2022
*MITACS Research Intern, Principal Investigator: Dr. Sheldon Andrews*
- Developed a novel framework for synthesizing natural user-styled get-up motions on various challenging terrains for simulated Physics-Based humanoid characters in Blender using Deep Reinforcement Learning.
- Trained style-conditioned motion-control Variational-Autoencoder RL policies using the PPO algorithm.

- **Manipal Institute of Technology** July 2021 - Dec 2021
*Research Assistant*
- Utilized self-supervised pre-training on unlabelled images for the improving classification performance for the task of Flooded Region Classification in aerial images. Achieved a higher F1-score (0.87) compared to simple supervised-learning (0.58).
- Used the SimCLR framework for pre-training a ResNet18 model on a small unlabelled dataset of aerial images, and fine-tuned the model on a labelled dataset of 398 images.

## PUBLICATIONS

- **Equivariant Offline Reinforcement Learning**: Pre-Print
- $SE(3)$ **Keyframe Action Transporter**: Under Review for *ICRA 2025*.
- **Leveraging Symmetries in Pick and Place**: Accepted for *International Journal of Robotics Research*.
- **Learning Stylized Get-Up for Physics-based Characters**: Accepted for *Symposium on Computer Animation 2022*.
- **Comparison of Texture Classifiers with Deep Learning Methods for Flooded Region Identification in UAV Aerial Images**: Accepted for *IEEE IGARSS 2022*.

## SELECTED PROJECTS

- **ReiLLi**: A Reinforcement Learning PyTorch library consisting of reliable implementations of Model-Free Deep RL algorithms. Tested on OpenAI gym environments, including MuJoCo environments, and supports parallel agent training. Github
- **Learnable Auxiliary Heuristics for Frontier-Based Planners**: Demonstrated performance gain for Frontier-Based Planning via Learned Heuristics with Deep CNNs for autonomous Exploration and Coverage of an Unknown Map. Completed Map coverage in 6.6% lesser steps on average. Technical Report